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ADDIS ABABA UNIVERSITY  
SCHOOL OF GRADUATE STUDIES

HIGH RISK BIRTHS, UNMET NEED IN FAMILY PLANNING,  
AND THEIR CORRELATES IN ETHIOPIA



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High Risk Births, Unmet Need In Family Planning,  
and Their Correlates in Ethiopia

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## Table of Contents

	Page
Acknowledgment .....	i-ii
Table of contents.....	iii-iv
List of tables.....	v-vi
List of Annexes.....	vii
Abstract.....	viii-ix
I. Introduction	
1.1. General Background.....	1
1.2. Justification and Significance of the study.....	3
1.3. Review of related Literature.....	6
1.3.1. High Risk Births.....	6
1.3.2. Biodemographic risk factors and childhood mortality.....	8
1.3.2.1. Sex of the child.....	8
1.3.2.2. Multiplicity of births.....	8
1.3.2.3. Birth order (Parity).....	9
1.2.3.4. Birth interval.....	9
1.2.3.5. Maternal age at birth.....	9
1.3.3. Unmet need for family planning.....	10
1.3.3.1. unmet needs and women's Characteristics.....	12
1.3.3.1.1. Demographic characteristics.....	12
1.3.3.1.2. Socioeconomic characteristics .....	13
1.4. Objectives.....	14
II. Data Source and Method of Analysis.....	16
2.1. Data Source.....	16
2.2. Operational definitions.....	17
2.3. Hypotheses.....	19

2.4. Variables.....	19
2.5. Method of Analysis.....	20
2.6. Data quality.....	21
2.6.1. Age data.....	22
2.6.1.1. Quality of reporting by individual women...	22
2.6.1.2. Quality of birth history data.....	23
2.7. Limitations of the study.....	26
III. Background characteristics of the study population.....	28
3.1. Demographic characteristics.....	28
3.1.1. Age distribution.....	28
3.1.2. Number of living children.....	29
3.2. Socioeconomic characteristics of women.....	30
3.2.1. Marital status.....	30
3.2.2. Educational attainment and Work status .....	30
3.2.3. Husband's education and Work status.....	31
IV. High Risk Births: the extent of the problem in Ethiopia.....	34
4.1. High risk fertility behavior.....	34
4.2. Women's reproductive intentions.....	37
4.3. The prevalence of high risk births in Ethiopia .....	39
V. Multivariate Analysis.....	56
5.1. Bio-demographic factors and mortality risk of children.....	56
5.2. Socioeconomic determinants of unmet high risk birth need for family planning .....	60
VI. Summary, Conclusion and Recommendation.....	63-67
References	
Annexes	

## *list of Tables*

Table:	Page
2.1. Number of children everborn, children dead, Sex ratio, and proportion of children dead (weighted), Ethiopia, 1990 FFS.....	25.
3.1. <i>Percentage distribution of the respondents (weighted) by broad age groups , Ethiopia, 1990 FFS.....</i>	<i>29</i>
3.2. Percentage distribution of currently married and ever married women (weighted) by number of living children, Ethiopia, 1990 FFS.....	29
3.3. Percentage distribution (weighted) of the respondents by marital status and place of residence, Ethiopia, 1990 FFS.....	30
3.4 Percentage distribution of women (weighted) by educational level and work status; and by residential areas, Ethiopia, 1990 FFS.....	32
3.5. Percentage distribution of husband's (weighted) by selected socioeconomic characteristics, Ethiopia, 1990 FFS.....	33
4.1. Proportion of women who fell into Single and/or Multiple high risk categories, Ethiopia, 1990 FFS.....	35
4.2. Percentage distribution of all women interviewed according to total number of children desired by number of living children, Ethiopia, 1990 FFS.....	38
4.3. Percentage distribution of children born to the mothers at risk five years preceding the survey and their risk of mortality, Ethiopia, 1990 FFS.....	40
4.4. Percentage distribution of children born to mothers at risk five years preceding the survey and their relative risk of mortality by urban and rural residence, Ethiopia, 1990 FFS.....	43
4.5. Percentage distribution of children dead and /or survive by their bio-demographic risk factors, Ethiopia, 1990 FFS.....	46
4.6. Percentage distribution of women (unweighted) at risk with their health based spacing and limiting need, Ethiopia, 1990 FFS.....	49

4.7. Percentage distribution of women in the high risk category and their met and unmet high risk birth need for family planning, Ethiopia, 1990 FFS.....	51
4.8. Percentage distribution of women (weighted) by their reasons for not using family P planning and place of residence, Ethiopia, 1990 FFS.....	53
5.1. Results of the logistic regression analysis of mortality risks of children by biodemographic risk factors, Ethiopia, 1990 FFS.....	59
5.2. Results of the logistic regression analysis of the determinants of high risk birth need for family planning, Ethiopia, 1990 FFS. ....	60

## *List of Annexes*

<b>Annex</b>	<b>Page</b>
1. distribution of live births that occur to the mothers at risk five years preceding the survey and their relative risk of mortality, Ethiopia, 1990 FFS.....	68
2. Distribution of live births that occur born to the mothers at risk five years preceding the survey and their relative risk of mortality, Urban Ethiopia, 1990 FFS.....	69
3. Distribution of live births that occur to the mothers at risk five years preceding the survey and their relative risk of mortality, Rural Ethiopia, 1990 FFS. ....	70

## Abstract

Early marriage and childbearing are considered to be the norms in many developing countries-resulting higher total fertility rates. The prevalence of maternal, infant and child mortality is partially attributed to higher fertility rates. Maternal demographic factors: age, parity (birth order), and birth interval help to determine health risks associated with pregnancy and childbirth. Assessing the magnitude of high risk fertility behavior and the incidence of high risk births is crucial for health and family planning policy makers and service providers. Reproductive health/family planning services can delay or prevent pregnancy and will reduce health risks for the mother and child. Thus, the identification of non- users of reproductive health/family planning services on the basis of health risk criteria will help policy makers and service providers to design appropriate intervention strategies including IEC and service delivery.

This study has attempted to see health risks (both to the mother and child) related to age, parity and birth interval; and the use of family planning to alleviate the problem in Ethiopia. The 1990 National Family and Fertility Survey (carried out by CSA) data has been used for this purpose. All women interviewed (8757 women) and births that had occurred five years preceding the survey were treated. However, the result of this study does not represent areas which were not covered in the survey (Tigray, the nomadic areas, North and South Gondar, North and South Wello). The Univariate, bivariate and the logistic regression model have been used in the analysis.

The results of the study revealed that the largest proportion of women of reproductive ages in Ethiopia fall into: too young (< 18), too old (> 34) and too many (four or more children) categories. Moreover, like many other sub-Saharan African countries old maternal age and high parity; and high parity and short birth interval appeared to be the most important multiple risk factors in Ethiopia. These women under the above mentioned risk categories will run a risk when they intend to give birth. Children born within short birth interval were at an increased mortality risk than those born after an interval of 24 months. Twin births and first order births also experience an elevated mortality risk. The use of family planning is believed to reduce mortality risk of children. However, the unmet high risk birth need for family planning to avoid high risk pregnancies was found to be higher. Women's education and rural residence were identified as the main explanatory variables for unmet reproductive health/family planning need to avoid high risk births. The study concludes that provision of reproductive health/family planning methods irrespective of sex and residential areas; raising the existing legal age at first marriage; and closing the gap in education between boys and girls could help to reduce the risk of dying both to the mothers and their children.

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## **INTRODUCTION**

### **1.1. General Background**

Sub-Saharan Africa has the world's highest fertility and maternal, and infant mortality rates (Sai and Nassim, 1991). These high rates can be explained by the fact that health care services are exceedingly limited and the prevalence of contraceptive use is generally low, although there are significant variations among sub-regions and among countries as well. Another factor making pregnancy and birth risky is the fact that the matrimonial and maternal roles start quite early in life and this situation is known to be among the major correlates of high maternal, infant and child morbidity and mortality rates. Infant and child mortality rates are known to be high among children born to women under 20 and over the age of 34. A mother with short birth interval i.e., less than two years between two pregnancies does not have sufficient time for recovery from the previous pregnancy and is likely to suffer from both physical and psychological exhaustion.

In the third world countries, however, data on reproductive mortality are lacking and the absence of time series data makes a statistically meaningful assertion about trends difficult. Some studies have shown that low levels of education, early age at marriage and childbearing to be the root causes of high risk births.

High- risk births not only jeopardize the health of the mothers but also the health and the well-being of children. Children are more likely to fall ill and die if they are born close together (less than two years apart), or born after the woman has already had many children. It is generally, believed that the use of contraception has important benefits in

terms of preventing the risk of dying both to the mothers and children. It is known that many mothers do not want more children than they have but lack access to the means of preventing unwanted pregnancies. This represents an important unmet need of women in the region. This indicates an unmet need for family planning. Thus the extent of unmet need among married women indicates the potential number of users of family planning if these couples had access to appropriate services. However, the preference based unmet need (i.e., unmet need based on women's desire to space or limit births) leaves out a substantial number of women who do not want to be pregnant but lack access to the means of preventing it.

The present study, among other things, focuses on identifying high risk women in Ethiopia with such unmet needs including sexually active and never married women. For example, in Ethiopia the incidence of premarital conception was 6.0% for Addis Ababa, 5.4% for other urban and 3.6% in rural areas (CSA, 1993: 16). This new measure of unmet need for family planning is termed as unmet high risk birth need.

- Demographic and Health Surveys (DHS, 1996) in Africa indicate that contraceptive use in sub-Saharan Africa remains relatively low compared with other regions. In most countries, family planning methods are less frequently used by the rural population (due to a variety of reasons such as differences in cultural values, education or the availability of services) than by people living in town and cities. Contraceptive use is also low in some urban areas. But most importantly the prevalence of contraceptive use is low among persons belonging to certain religious or social groups

Where fertility and mortality rates are high such as in Ethiopia, family planning can have a substantial impact on maternal and infant mortality. In addition reducing fertility and improving women's health via reproductive health/family planning services can improve individual productivity, family well-being and national economic development. Thus, the identification of non-users of reproductive health/family planning services on the basis of health risk criteria will help policy makers and service providers to design appropriate intervention strategies including IEC and service delivery. Identification of the number, characteristics and location of potential users of modern reproductive health/family planning services will facilitate efficient resource allocation to reduce the risk of maternal and infant and child mortality. Thus there is an urgent need for in depth studies on high risk births, and unmet need in Ethiopia.

### ***1.2. Justification and significance of the study.***

Increased family size and high fertility rates have negative effects on the health and well-being of women and children. Moreover, a woman's age at first marriage and at first pregnancy continue to be useful indicators of her reproductive health status.

The population of Ethiopia is very young with a mean age of approximately 17 years. Nearly half of the country's population is under the age of 15. Moreover, the mean age at first marriage was 15.6 years for the country (for both rural and urban areas). It was slightly higher for Addis Ababa i.e. 16.2 years (CSA, 1993). The majority of these women are expected to have their first child within 24 months of the start of the first union. Thus early childbearing (<18 years) put the young women and the child at a greater mortality risk .

Available data from Ethiopia suggest that teenage women are twice as likely to die from pregnancy related conditions as are women 20-24 (UN, 1989; cited by Fortney and Kiragu, 1995). Thus, women's mortality risk may be greater during adolescence than at any other time in their reproductive life cycles. Probabilities of dying from maternity related causes is also high for women who continue child bearing after the age of 34. This is due to the fact that women with such prolonged reproductive careers suffer from a biological depletion syndrome.

In examining the incidence of maternal mortality in Sub-Saharan Africa, (Fortney and Kiragu, 1995) stated that women in a high-risk birth category are more likely to experience problems during pregnancy or delivery, and their infants are more likely to die before, during or soon after birth.

The National population policy of Ethiopia (1993) seems to have recognized the relationship between fertility and mortality when it called for a significant reduction of maternal, infant and child mortality rates as a condition for launching an effective fertility regulation program. The rationale behind this is that as long as a high infant and child mortality regime continues the replacement urge will remain powerful and a high fertility regime is maintained.

In Ethiopia infant mortality rate and maternal deaths are 120 per 1,000 live births and 1400 per 100,000 live births respectively (World population data sheet, 1997). However, the latter estimate seems questionable because of lack of data for estimating the magnitude of the problem. In spite of the difficulties in measuring pregnancy related mortality, the risk of

dying from maternal causes seems to be a common problem in Sub Saharan Africa. Ethiopia is not exception to such a situation.

Better knowledge of risk factors or the prevalence of high risk births both to the mother and child, are of a considerable significance in terms of enabling policy makers and program designers to formulate appropriate intervention strategies. Here in Ethiopia, many research works had also been done (for instance: Mekonnen, 1993; Mulugeta, 1995; and Meaza, 1997) to determine the differentials, and levels and trends of infant and child mortality. However, none of these research works have considered high risk fertility behavior and the resulting mortality risk to children.

In Ethiopia, attempts were made to conceptualize and measure unmet need for family planning on the basis of woman's desire for children (Daniel, 1993; CSA, 1993; Abdulahi et al., 1994; and Dilnesaw, 1995). However, not all these studies have taken into account the role of fertility regulation in the effort to promote better maternal and child health. Limited works have been done on high risk births in Addis Ababa (Tekabe et al., 1994). Hence the relevance of the present study. It will fill the gap in knowledge and serve as a stepping stone for further in depth studies and pin-point intervention areas that could alleviate health risks.

### **1.3. Review of related Literature**

#### **1.3.1. High Risk Births**

Early marriage and childbearing are considered to be the norms in many developing countries. Traditional marriage norms still exist in Africa and Asia today strongly favoring early marriage for women (UN, 1988). Women in Africa tend to marry at very young age because it provides man's family longer reproductive period to bear children and also their families want to avoid the risk of an illegitimate birth. It was estimated that singulate mean age at marriage is under 18 years (UN, 1990)in: Ethiopia (1984), Mali (1987), and Mozambique (1980). Women in Latin America, however, tend to marry later than in Africa and much of Asia (Acsadi George T.F. et al., 1994). On the average, women who marry between 15 and 19 years of age will have six or seven children (Population Reports, 1988). The total fertility rate for Ethiopia is estimated as 7.0 (World Bank, 1995) a situation partly explained by young age at marriage for girls and hence longer time for childbearing.

In recent years researchers have stated that age at marriage and at childbearing, the time of childbearing, and the number of children that a woman bears helps to determine her risk of dying at any point in her reproductive years (Acsadi George T.F. et al., 1994). Higher fertility rate is, therefore, an indicator of higher risks of dying both to the mothers and children (Sai and Nassim, 1991). This suggests that maternal mortality be high where fertility is high and low where fertility is low. Moreover, women in Africa face two to three times the risk of dying in childbirth as women in Asia (Ibid).

The risks associated with pregnancy and childbirth are mainly determined by a set of biological factors. Mosley and Chen (1984) and Govindasamy et al., (1993) have identified three maternal factors: age, parity (birth order), and birth interval as important determinants of child and maternal mortality. A fairly extensive literature examines the independent and combined effects of these variables on child and maternal mortality (Population Reports, 1984). The conclusion arrived at on the basis of available data is that childbearing at too early an age put the woman and the child at risk of mortality. This could be due to lack of physical maturation (Atikens and Walls, 1996), lack of early and adequate prenatal care (Geronimus, 1987), and the child may not be wanted (Govindasamy et al., 1993). Moreover, young mothers are more likely to be less educated and economically disadvantaged.

Studies also indicate that older women (35 years and above) are more likely to have serious complications during pregnancy. These elevated risks are likely to be aggravated if combined with short birth intervals (Koenig et al.,1990; and Majumder, 1991). Others, (Govindasamy et al.,1993; and Herz and Measham, 1987; Miller and Huss-Ashmore, 1989; Merchant et al., 1990 cited in Fortney and Kiragu, 1997) stated that excess risk for the mother and the child results mainly from maternal depletion syndrome and competition between siblings. However, if the woman has three or fewer births between the age of 20 to 34, her risk of mortality is reduced. On the other hand, Bicego and Ahmed (1996) found that women who have had many children close together face a much higher risk of dying during pregnancy and delivery

### **1.3.2. Biodemographic risk factors and childhood mortality**

Mosley and Chen (1984) put five variables in their conceptual model as proximate determinants of childhood mortality. Accordingly, many studies all over the world, including Ethiopia, used these variables as proximate determinants of infant and child mortality. Recently, there has been a considerable emphasis on biodemographic characteristics as the main risk factors for infant and child mortality. The risks of dying for the mother and the child are not equally spread in different populations due to variations in these factors.

#### **1.3.2.1. Sex of the child**

Most studies reported that male children have a higher chance of dying relative to female children. The excess male child mortality risk ratios are most pronounced during the neonatal than during the late childhood period (Bicego and Ahmed, 1996). Such sex differentials in mortality risk are expected to be minimal or negligible thereafter (Boerma and Bicego, 1992).

#### **1.3.2.2. Single or multiple births**

It is revealed from the literature that children of multiple births are more likely to die than children who are single births (Bicego and Ahmed, 1996). Multiple birth babies may suffer complications before and after birth, and/or competition for time, attention, and material resources of the mother after birth than single births.

### **1.3.2.3. Birth Order (Parity)**

First births and births of high order (Four and above ) are known to be associated with mortality risk than second and third order births. Children born to very young mothers and those who are first born tend to have higher risk of dying. Several studies also revealed that mortality risk increases with birth order. The study done in Sebeta town (Mekonnen ,1993) also confirmed the negative health effects of first and higher order births. Furthermore, Miller et al., (1992) have found that children in the high birth orders and born with short birth intervals are riskiest. However, there is a considerable confusion in the literature about the relative importance of age and parity of the mother in determining the risk of infant and child mortality.

### **1.3.2.4. Birth spacing**

Several studies have found an association between short birth interval and child survival (De Swemer, 1984; Knodel, 1968; and Swenson, 1981 cited in Koenig et al., 1990; Boerma and Bicego, 1992; Majumder, 1990; Winikoff, 1988; Pebley and Millman, 1986). Apart from the problem of death evidence, the association between birth interval and the risk of death remains strong in different studies. Thus infant and child mortality risk are expected to increase sharply as the length of birth interval decreases.

### **1.3.2.5. Maternal age at birth**

Young age at birth (<20 years) and advanced age at birth (35+ years) are found to be associated with mortality risk in much of the literature. Several studies indicated that the lowest risk of dying is observed at the middle of the woman's reproductive period. Pebley

and Millman (1986) revealed that maternal age and parity (birth order) are related to birth spacing. However, both appear to be strongly related to child mortality (Smith and Ferry, 1984 cited in Cleland and Rutstein, 1986). Maternal age and/or parity are expected to have a U-shaped pattern indicating lowest risk at the middle of women's reproductive period and for second or third order births (Ibid.). All these suggest that biodemographic factors are highly correlated with one another as determinants of child mortality.

Shane (1997) stated that the lives of children and their mothers can be saved by spacing births at least two years apart and by enabling women to have their desired number of births. The results from numerous studies indicate that family planning programs may have an important impact on child survival by increasing the length of birth intervals between births (Westoff and Ryder, 1977 cited in Cleland and Rutstein, 1986). Family planning services are therefore expected to minimize the risks associated with childbearing in areas of high fertility.

### 1.3.3. Unmet Need for Family Planning

The use of family planning enables a woman to delay motherhood, to space her births, to avoid high risk pregnancies, and to stop childbearing when she has achieved her reproductive goals. By doing so it minimizes maternal, infant, and child mortality resulting from high risk births. Thus the health benefits of family planning are greatest where health conditions are poor and fertility rates are high. Furthermore, eliminating all births to women under 20 and over 35 years of age would result in the prevention of 30 percent of births and over half of maternal deaths (Winikoff and Sullivan 1987) Trussell and Pebley (1984)

using data from Matlab, Bangladesh also estimated a median reduction of infant and child mortality by 24 percent and 13 percent respectively, if all births were spaced at least two years apart. However, in many developing countries the use of family planning is not widespread for many reasons.

In Sub-Saharan Africa more women are vulnerable to a high risk birth than in any other region, and fewer are using contraception (Govindasamy et al., 1993). Millions of women in developing countries or about one married woman in every five have unmet need for reproductive health/family planning services (Population Reports, 1996). The condition seems to be worse in Africa, where it is estimated that approximately 10.0% of women in their reproductive years and 30.0% of married woman have unmet needs for family planning (Ibid.).

In spite of many obstacles facing the use of contraception, women might know the negative health consequences of their reproductive behavior. African women are aware of fertility regulation and have used traditional methods of contraception (Bledsoe et al., 1993, cited in Graham, 1993). However, the idea of limiting the number of births in most African societies is culturally unacceptable.

In general, the level of unmet need largely depends on two factors: fertility desires and contraceptive use. Westoff and Bankole (1995) found that it rises as more women want to control their fertility and falls as more women use contraception. The reason why many women who prefer to avoid or postpone pregnancy do not use contraception include: lack of information, unsatisfactory services, fears about side effects, and opposition from



husbands, relatives or others (Population Reports, 1996). Therefore, gradual development of a new value or behavior is expected to increase the adoption of contraception.

### **1.3.3.1. Unmet Needs and Women's Characteristics**

Studies have shown that unmet need varies substantially according to women's demographic and socioeconomic characteristics. The level of family planning in a population can be determined by looking through the woman's demographic and socioeconomic background.

#### **1.3.3.1.1. Demographic Characteristics**

Family planning promotes health by assisting women to avoid unwanted pregnancy soon after a birth, when they are too young, too old, or already have four or more children (George T.F. Ascadi et al., 1994). Though the health benefits of family planning methods are greatest, younger and older women are more likely to have unmet need for family planning. The preference based unmet need for family planning is measured taking into account the woman's spacing and limiting desires. Bongaarts and Bruce (1995) stated that such measure of unmet need for family planning ignores the unmarried young adults-one of the largest groups whose needs for contraception are not being met. Therefore, recently there is an increased interest on the measurement of unmet high risk birth need for family planning.

De Graff and Silva (1996) after identifying non-users of contraception have used maternal age, birth order and length of preceding birth interval and their combination to

determine unmet high risk birth need for spacing and /or limiting births. These demographic factors also help to determine the risk of dying to mother and child. In general family planning is a health requirement of all women of reproductive ages.

#### **1.3.3.1.2. Socioeconomic Characteristics**

Studies made using the WFS data also have shown that education of women is strongly associated with the use of modern contraception. However, despite this strong association of use and education, most of educated women in Africa face the same obstacles in the use of contraception as the less educated ones and they do have some unmet need (Westoff and Bankole, 1990). This is partly because their demand for family planning is higher. In Ethiopia , the proportion of currently married women using contraception among those with no formal education, primary, junior secondary, and senior secondary and above was 2.7%, 19.1%, 37.8%, and 56.8% respectively (CSA, 1993). Since education and work status/occupation in particular provide autonomy for the women in reproductive decisions, working women outside home would have the lowest unmet need or higher contraceptive use than their counterparts. This could be due to their exposure to modern ideas and they may find the work role incompatible with the mother role. Thus their contraceptive use becomes higher while their unmet need is lower. Moreover, if the husband is well educated, they are more likely to use contraception.

The World Fertility Survey data also show that in nearly every country urban women were more likely to use modern contraception than rural women. On the contrary, Westoff and Bankole (1995); and Westoff and Ocha (1991) hypothesize that unmet need in Sub-Sahara

is either greater in urban areas or about the same as in rural areas. Supporting this idea, the study made by Dilnesaw (1995) in Nazareth town, Ethiopia, found a considerable unmet need (35.1%). Urban women may also have higher demand, just like more educated women. These factors increase the number of women with unmet need.

Concerning the relationship between religion and use of contraception, Bertrand et al., (1985) found no difference on the use of modern contraception and unmet need among different religious groups. Similarly, the study conducted in Ethiopia on the national level (Abdulahi et al., 1994) and in Nazareth town, Ethiopia (Dilnesaw, 1995) revealed that women's religion and ethnic groups were found to be unrelated to their contraceptive use.

Widely available family planning and other reproductive health services such as prenatal care, safe delivery and postnatal care allow women to minimize high risk births and maximize their health.

#### **1.4 Objectives**

The general objective of the present study is to empirically examine the general relationship between fertility related and mortality related variables in women of reproductive age and children of under five. The specific objectives of the research are to:

1) Estimate the proportion of women and their livebirths falling into high risk category (age, parity and birth spacing);

- ii) Examine the relationship between infant and child mortality risk and demographic risk factors such as birth order (parity), intervals between pregnancies, and births to women under the age of twenty and above the age of 34;
- iii) Estimate unmet need for reproductive health/family planning services;
- iv) Examine the effects of socioeconomic factors on the unmet need for reproductive health/family planning services;
- v) Recommend intervention strategies that could alleviate fertility related mortality risks, and for research on the subject in the future.

## CHAPTER TWO

E.B.P.  
c.c.m.

### *Data source and method of Analysis*

#### **2.1 Data source**

The study on High Risk Births, Unmet needs for reproductive health and family planning services and their correlates in Ethiopia is based on data generated by the National Family and Fertility Survey (NFFS) conducted by the Central Statistical Authority (CSA) in 1990. The survey was able to collect a large variety of data on fertility and reproductivity related issues including data having direct bearing on maternal and child health in Ethiopia.

The issue of high risk births was addressed on tangentially by the NFFS. But knowledge on the subject is vital in terms of policies and programs pertaining to maternal and child health to be designed now and in the future. It is basically to fill this information gap that I decided to address this particular issue and identify the groups that are likely to be affected by it. The source of the data for this endeavor is, therefore, the NFFS and the data generated by it is recast to be usable in the analysis of risk factors. The NFFS sample of 8757 women (5913 and 2844 women from rural and urban areas, respectively) and their birth history and family planning information are used in the present study. However, the results of this study do not represent areas which were not covered in the survey (Tigray, the nomadic areas, North and South Gonder, and North and South Wello).

## 2.2. Operational definition

### High-risk births

A birth is defined as a fertility related high-risk birth if one or more of the following conditions apply:

.the mother is below the age of 18 or more than 34 years at the time of the birth;

*.the woman has already had four or more livebirths; or*

.the birth occurs within 24 months or less of a previous birth (Govindasamy et al.,1993).

#### a) Single high risk category:

What this means in practice is that pregnancies to women under 18 and above 34 years are risky; pregnancies within short birth intervals are risky and pregnancies on and beyond a birth order of three are also risky.

#### b) Multiple high risk category:

Multiple risk categories are those combining two or more demographic risk factors. Examples in point are: the combination of teenage, and short birth interval; a combination of pregnancies occurring to women who are 34 years or older and short interval pregnancies; or a combination of later age, short interval and high parity pregnancies.

#### ***Unmet High-risk birth need (Unmet HRB-need)***

It is defined as "Non users of contraception who are capable of conceiving, who are exposed to the risk of pregnancy and who, if they were to become pregnant, would experience an elevated risk of mortality for their expected child, their living children or themselves " (De Graff and Silva, 1996: 140).

This approach is considered to be the best way of identifying high risk birth women who are in need of contraception. It has been developed and used in the research work of P.Govindasamy and S.O.Rutstein (1993), P.Govindasamy et al., (1993) and the World Bank (1991).

In this study women less than 18 years old or have had the latest birth less than 24 months; and women more than 34 years old or have had four or more livebirths at the time of the survey and not using contraception are considered to have unmet high risk birth need for family planning.

### **Preference based unmet need**

Westoff and Ocha (1991) defined preference based unmet need as " women who are currently married or living in a union, capable of conceiving, not pregnant, and desire to space and/or limit births, but are not using contraception".

### ***Relative risk (Risk ratio)***

It is defined as the ratio of the proportion of dead children in a given high risk category to the proportion of dead children not in any high risk category (Ramesh B.M., et al.,1995).

## **Biodemographic risk factors**

The common biodemographic risk factors include: sex of the child, multiplicity of birth (single, twin, triplet, etc.), order of birth, age of the mother at birth, and length of birth interval (Bicego and Ahmed, 1996).

### **2.3. Hypotheses**

The study on high risk births and unmet need for family planning to prevent high risk pregnancies and childbirth has the following general hypotheses:

- a) Demographic factors like age, parity (birth order) and birth spacing affect survival chances of both mothers and their children.
- b) The likelihood that women will use contraceptives to prevent high risk births is a function of their socioeconomic characteristics such as education, residence, work status and religion .

### **2.4. Variables**

The study will have two dependent variables: 1) Child survival status and 2) Unmet high risk birth need for family planning. A set of biodemographic and socioeconomic factors have been used as explanatory variables for the dependent variables respectively. Biodemographic factors include: sex of the child, multiplicity of birth, preceding birth interval, birth order, and age of the mother at birth. Socioeconomic factors affecting unmet high risk birth need include: place of residence, education, work status, and religion; and husband's education and work status.

## 2.5 Method of Analysis

This study mainly used univariate and bivariate analysis. In the univariate analysis background characteristics of women, and the magnitude of high -risk births in different residential areas are examined. For the purpose of this study women were assigned to the risk categories (single or multiple) according to their age (<18 or >34 years), having birth interval of <24 months prior to the survey, and latest birth order 4 or more during the time of the survey. The combination of the demographic risk factors stated above also help us to classify women in the multiple risk categories. In here it should be noted that the mother and /or the child become at risk only when she intend to give birth soon after. Such classification of the women also helps to measure unmet need for family planning among women in the risk categories which is referred to as unmet high risk birth need for family planning.

In this study the magnitude of association between the demographic factors and the likelihood of death is examined using the relative risk (RR). All births that occurred five years preceding the survey 1990 FFS, therefore, have been classified into single or multiple risk categories of the women interviewed. Risk ratios are then calculated using the number of children dead and survive. The relative risk (rate ratio) is used to compare the risk of death for children exposed to the risk factors (demographic factors) relative to those who are not exposed.

Bivariate analysis has been done to examine unmet high risk birth need and its association with socioeconomic variables. This approach lays the basis for the logistic regression

model. To examine the effects of biodemographic factors in childhood mortality logistic regression model was used.

The same model has been used to estimate the effects of socioeconomic variables on the dependent variable, Unmet high risk birth need for family planning. The demographic variables, namely, age, and number of children have been used in the selection of women who are at risk of having unmet family planning need. Thus, these variables will not appear in the model as explanatory variables for unmet reproductive health/family planning need stated here.

The basic assumption of the model is that the probability that some event will occur over the probability that the same event will not occur (OR).

The model used in this study can be written as :

$$\text{Logit } P(x) = \alpha + B_1 x_1 + B_2 x_2 + \dots + B_k x_k.$$

Where  $\text{Logit } P(X) = \ln \left( \frac{p(x)}{1-P(x)} \right)$ .

Independent variables:  $x_1, x_2, \dots, x_k$ . Where  $k$  is the number of variables being considered.

$B$  = Regression coefficient

## 2.6. Data Quality

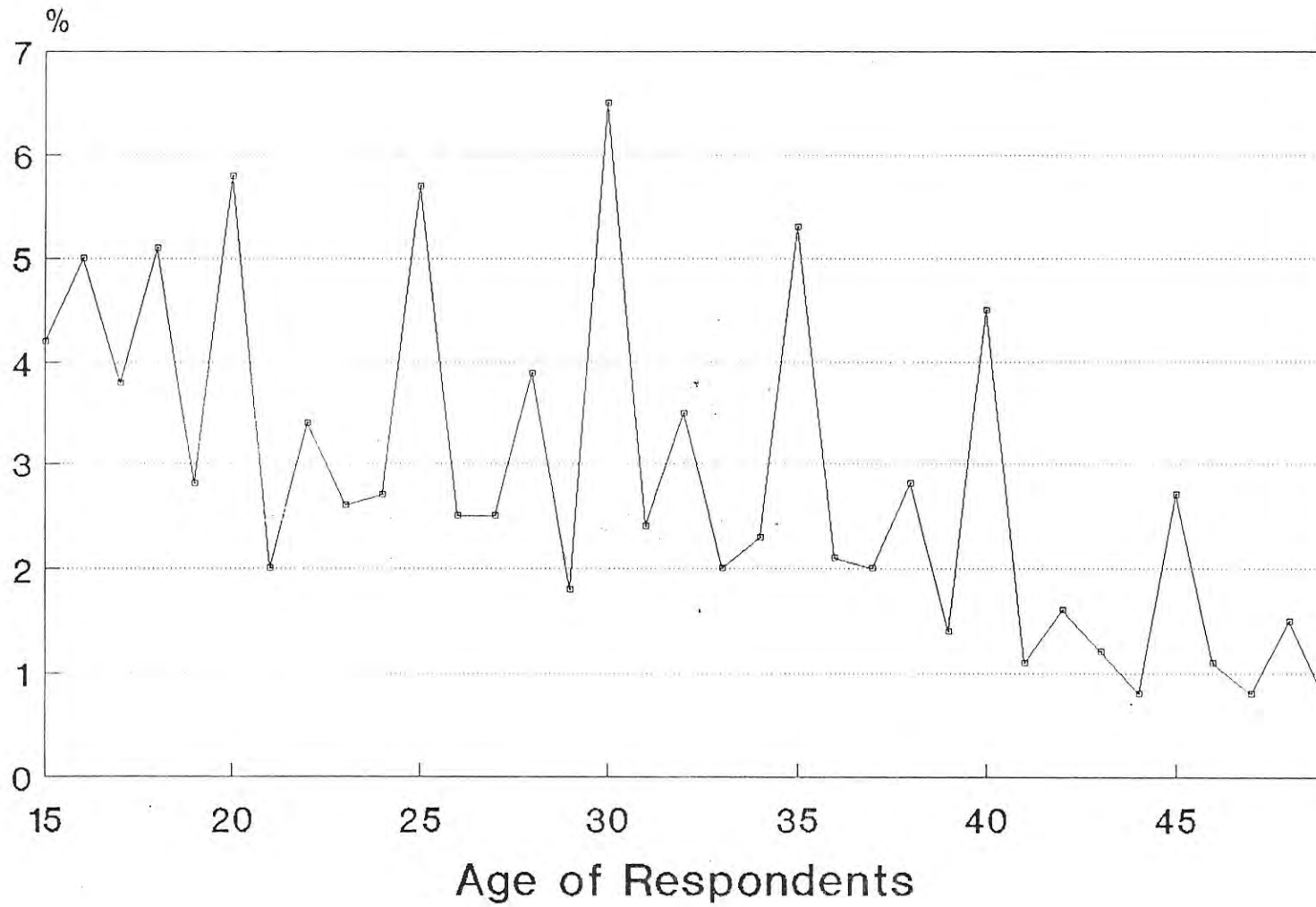
In many developing countries data related to child's dates of birth and age at death, and mothers' own birth date suffer from several deficiencies. However, the use of broad age grouping will minimize the problem of age reporting errors. Thus it is important to examine the quality of age and birth history data. Data errors due to omissions and/or misreporting are expected to have their own effect on the assessment of fertility related risk factors.

## 2.6.1. Age Data

### 2.6.1.1. Quality of reporting by individual women

In Ethiopia where the majority of the population is illiterate, age data may suffer from reporting errors. These errors will affect estimation of vital events. Most censuses and surveys in developing countries used event calendars to overcome this problem. However, in Ethiopia where there is heterogeneous society, the use of event calendars will add serious reporting errors. To ascertain the representativeness of the 1990 NFFS survey data, comparison was made by the Central Statistical Authority (CSA) between the age distribution of the survey data with the 1984 Population and housing census result. It was found that urban women, particularly those from Addis Ababa could exactly report their exact year of birth than the rural women (For details see CSA, 1993). Moreover, the age data of the respondents indicate heaping at ages ending in zero and five (see the figure on the next page). The need for evaluating age data of the respondents in this study seems a repetition of what has been already done earlier.

Percent distribution of women by single year of age, Ethiopia, 1990



### 2.6.1.2. Quality of birth history data

*Retrospective birth histories are known to be subject to errors of omissions and misplacements. Response errors due to omission of births and deaths; and misreporting is common when one member of the household supplies the majority of information (Ewbank, 1981, cited in Assefa, 1990).*

In the 1990 NFFS, respondents were asked detailed questions for both surviving and dead children. This might impose increased burden for the interviewers, and could result in displacement of births. Though the information is significant, this in turn will add data errors.

Although a critical evaluation of the data had been undertaken by the Central Statistical Authority, in this section the assessment of data quality is limited to consistency checks regarding sex ratios and the proportions of children dead. However, full evaluation and smoothing of the data is not attempted here due to time constraints.

Studies indicate that omission of births and deaths occur more frequently for children who are no longer living with their mother. Omission of dead children by the respondents may be deliberate or due to recall errors. In most cases children who died shortly after birth may not be considered as livebirths. This could result in the underestimation of neonatal mortality. Moreover, it will underestimate the effects of biodemographic factors on mortality risk of children.

On the other hand, most studies indicate that omission of surviving children, and the inclusion of adopted or fostered children is believed to be minimal. Misreporting of age at

birth and/or at death could alter the true birth interval between children, and result in heaping of deaths at certain ages.

The quality of birth history data could also be detected by comparing mortality estimates of the two consecutive surveys. In Ethiopia, where a fertility survey had been conducted only once, this method of evaluating the age data becomes difficult. However, data on children ever born has been used to evaluate the errors that might occur as a result of omission and misreporting.

**Table 2.1. Number of Children ever born, Average parity, Children Dead, Sex ratio, and proportion of Children Dead, Ethiopia, 1990 NFFS.**

Age Group	No. Of Women	Children Ever born		Sex Ratio of CEB	Average parity	Children Dead		Sex Ratio	proportion of children dead	
		Male	Female			Male	Female		Male	Female
15-19	1956	249	244	1.020	0.252	37	33	1.121	0.148	0.135
20-24	1444	1239	1176	1.053	1.672	219	180	1.217	0.178	0.153
25-29	1398	2374	2218	1.070	3.285	534	319	1.674	0.225	0.144
30-34	1419	3555	3374	1.054	4.883	819	657	1.246	0.230	0.195
35-39	1188	3503	3448	1.016	5.851	807	763	1.057	0.231	0.221
40-44	773	2580	2533	1.018	6.614	751	633	1.186	0.291	0.250
45-49	579	2034	1986	1.024	6.943	668	485	1.377	0.328	0.244
Total	8757	15534	14979	1.037	3.484	3835	3070	1.249	0.247	0.205

Source: computed by the Author from the FFS data.

The data table 2.1 indicates that sex ratios of children ever born and children dead by age of the mother. This approach helps to check the consistency of birth history data. Ideally, sex ratios should not vary systematically with age and their values should be between 1.02 and 1.07 (UN, 1983:76). The data (table 2.1) shows that sex ratios of children ever born was 1.04 for the county as a whole which agrees with the normal range.

Furthermore, the sex ratio of children dead increases with an increase in the age of the mother i.e., with some exception. These figures (i.e., in Table 2.1) agree with the literature, that mortality risk of male children is higher than that of female children. Though there appears a sudden decline in the sex ratio of children dead in the age group 35-39, the overall pattern seems to be consistent. Similarly, the proportion of male children dead exceeds those of female children. Moreover, rapid increase in the proportion of dead children for both sexes was observed with increasing age of mothers particularly in the last three age groups. The pattern of average parities also follows a rising trend from younger to older ages, and agrees with the childbearing period of the women in each age group. In other words, the longer the childbearing period of the woman, the higher the average parity.

## ***2.7. Limitations of the study***

Studies indicate that deaths associated with pregnancy and childbirth in Africa leave many children motherless. The World Health Organization (WHO, 1991 cited in Ramesh B.M., 1995) had estimated that worldwide at least one-half million women die every year from causes related to pregnancy and childbirth and the majority of these deaths occur in developing countries. However, quantifying the magnitude of this problem is not simple particularly where there is incomplete information.

Moreover, maternal deaths are not only the result of reproduction, but could be caused by other health related events. In most cases adequate assessment of the problem requires follow-up study and large sample size. Thus, it is expected to be expensive and time consuming. Due to this reason many studies use hospital records while others collect this information in their demographic survey using a series of follow-up questions. Though it is difficult to get reliable informant, the respondents could be asked about whether the woman was pregnant when she died, whether the death occurred during childbirth, and so on. It is on the basis of this information that the estimates of maternal deaths can be made. In the 1990 NFFS, such questions were not asked and the prediction of maternal deaths could be difficult. Moreover, maternal mortality is not only the consequence of high risk births . Other factors may cause maternal morbidity and mortality too. All these areas are broad and intertwined with different explanatory variables. Thus examining maternal mortality and all the differentials of childhood mortality is beyond the scope of this study.

## Chapter Three

### **Background Characteristics of the study population.**

The 1990 National Family and Fertility Survey of Ethiopia Provides information on the key socioeconomic and demographic characteristics of the sampled women. Such information is useful to evaluate the fertility behavior and contraceptive use of the population under the study. This chapter presents important background characteristics of the women using descriptive values.

#### **3.1. Demographic characteristics**

##### **3.1.1. Age distribution**

The pattern of age distribution is crucial for any demographic analysis. As the age data in table 3.1 show, the largest proportion of women appear in the first age group 15-19 regardless of place of residence. All urban centers other than Addis Ababa account for the largest percentage of the urban residents. The largest proportion of women in the youngest age group in all residential areas indicate a longer reproductive span and high fertility rates in the country.

The data in the following table also indicate that as age increases, the proportion of women decreases in both rural and urban areas. The pattern of age distribution of the respondents obtained by the FFS was compared with the 1984 census result and it did not show variation (CSA,1993).

**Table 3.1. Percentage distribution of respondents by broad age groups, Ethiopia, 1990 NFFS.**

Age group	Rural N=5913	Other Urban N=1293	Addis Ababa N=1551	Total N=8757
15-19	19.6	29.4	26.8	22.3
20-24	16.5	14.0	18.5	16.5
25-29	16.5	15.2	14.6	16.0
30-34	17.3	14.2	13.7	16.2
35-39	13.6	13.9	13.1	13.6
40-44	9.4	7.7	7.6	8.8
45-49	7.1	5.6	5.7	6.6

**Source:** computed by the Author from the 1990 FFS data.

### 3.1.2. Number of living children

The level of unmet need is also associated with the number of living children. But the need for spacing and limiting births are expected to cancel each other out with an increase in the number of children. The data from the table below indicate that relatively large family size is the norm in Ethiopia. Thirty one percent of the married women and 35.0% of the ever married women had between one and two children at the time of the survey.

**Table 3.2. Percentage distribution of currently married and ever married women by the number of living children, Ethiopia, 1990 NFFS.**

Number of living children	Currently married N=6287	Ever married N=928	Total N=7215
0	10.4	21.4	11.7
1-2	31.0	34.9	31.5
3-4	28.8	21.0	27.9
5+	29.7	22.7	28.9
<b>Total</b>	<b>87.8</b>	<b>12.2</b>	<b>100.0</b>

**Source:** computed by the Author from the 1990 FFS data

**Note:** Never married women account for 17.6% (1541) of the sampled women and are not included in the above table.

Approximately 30.0% of the currently married women and about 23.0% of the ever married women have had five children. Approximately 59.0% of the married and about 44% of the ever married have reported to have three or more living children.

### 3.2. Socioeconomic characteristics of the sampled women

*Among the Socioeconomic characteristics of the respondents: marital status, education, work status and education and work status of their husbands are believed to exert a significant impact on their understanding of the dangers of high risk births and the use of family planning services.*

#### 3.2.1. Marital status.

Marriage is an important event in its own right affecting fertility and the status of the women. Table 3.3 provide information on the distribution of respondents by marital status and place of residence.

**Table 3.3. Percentage Distribution (weighted) of the respondents by marital status and place of residence, Ethiopia, 1990 NFFS.**

<b>Marital status</b>	<b>Rural N=5913</b>	<b>Other Urban N=1293</b>	<b>Addis Ababa N=1551</b>	<b>Total N=8757</b>
Currently Married	76.5	49.5	40.6	71.8
Ever Married	8.1	18.7	16.5	10.6
Never Married	15.4	31.8	42.9	17.6
Total	100.0	100.0	100.0	100.0

**Source:** Computed by the Author from the 1990 FFS data.

Approximately 30.0% of the currently married women and about 23.0% of the ever married women have had five children. Approximately 59.0% of the married and about 44% of the ever married have reported to have three or more living children.

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Ever Married	8.1	18.7	16.5	10.6
Never Married	15.4	31.8	42.9	17.6
Total	100.0	100.0	100.0	100.0

**Source:** Computed by the Author from the 1990 FFS data.

The data indicate that marriage is universal particularly in rural areas of Ethiopia. Only 17.6% of women have never entered into marital union. The proportion never married was by far lower in rural areas (15.4%). Almost 72 percent of women in Ethiopia were currently married. The proportion currently married was 76.5 percent in rural areas, about 50% and 41% in other urban areas and in Addis Ababa respectively.

On the contrary, the proportion of ever married women in urban areas of Ethiopia (Addis Ababa and other urban areas) were about twice or more compared with rural areas. However, the proportion of ever married women was relatively lower (16.5%) for Addis Ababa. The pattern of marriage in any country helps to understand the fertility patterns.

### **3.2.2. Educational attainment and work Status.**

Educational attainment and work status of the respondents are important factors affecting whether or not they would engage in risky pregnancy related behavior. The data (table 3.4) revealed that 63 percent of the women were illiterate, 22.6% have had some primary education, nearly 14 percent have had some secondary education and less than one percent have had some post-secondary education. The table also shows that 46.3% of women interviewed from other urban areas were currently working followed by Addis Ababa (35.6%); while 62.3% of women interviewed from rural areas were economically active.

**Table 3.4. Percentage distribution of women by educational level and work status by residential areas, Ethiopia, 1990 NFFS.**

Characteristics	Rural N=5913	Other Urban N=1293	Addis Ababa N=1551	Total N=8757
Education:				
No Education	74.7	34.5	19.6	63.0
Primary Education	20.2	31.1	28.3	22.6
Junior & Sen High sch	5.0	43.1	48.3	13.8
Higher Education	0.1	0.3	3.8	0.6
Work Status:				
Currently Working	62.3	46.3	35.6	48.7
Not currently working	37.7	53.7	64.4	51.3

**Source:** computed by the Author from the 1990 FFS data.

Despite the low level of education in rural areas, 62.3 percent of the women participate in the labor force (aside from housework such as cooking and washing) or they were doing any other work, the opposite is true in Addis Ababa and other urban areas. Urban women particularly from Addis Ababa are more likely to be literate than the rural women while the latter are more likely to be economically active i.e., they participate in agricultural activities.

### **3.2.3. Husband's education and Work Status**

In the 1990 NFFS, a higher proportion of males than females have completed each level of education. Table 3.5 show percentage distribution of husbands, and their work status. The FFS result also indicates that about 74 percent of husband's were illiterate and 20 percent of them had primary education. The percentage of husbands who have at least primary and

junior and senior high school education was higher than that of their wives. Of the total sampled households, over 98% of husbands were employed.

**Table 3.5. Percentage distribution of husband's by their selected Socioeconomic characteristics, Ethiopia, 1990 NFFS.**

<b>Background characteristics</b>	<b>Number</b>	<b>percent</b>
Education:		
No Education	4640	73.8
Primary and Junior	1270	20.2
Senior sec. and higher	377	6.0
Work Status:		
Currently Working	6180	98.3
Not currently Working	107	1.7

Source: computed by the Author from the 1990 NFFS data.

The data indicate that the majority of husbands were not educated and the proportion of men with better educational level is lower compared with the non educated ones. However, men seem better in their employment status compared with their wives and this could have its own role on women's fertility and contraceptive use.

All the socioeconomic background characteristics of the respondents and their husbands could play a significant role on the reproductive behavior of women. In particular women's characteristics (age, parity, and birth interval) are taken as a barometer for the risk of death both to the mother and the child.

## CHAPTER FOUR

### High risk births: the extent of the problem in Ethiopia.

#### 4.1. High -Risk Fertility Behavior.

Demographic factors: age, parity, and birth spacing help to determine the magnitude of the risk (i.e., both to the mother and child) associated with pregnancy and childbirth. A woman's age and parity affect her chances of dying in childbirth. Studies on high risk births have summarized health risks related to age and parity as the "four too's"-too young, too old, too many, too close together (Population Reports, 1994).

Women under age 18 and those over age 34 face greater risk than women between these ages (Govindasamy et al.,1993). Of course age and parity, are not risks in themselves; they put the women at higher likelihood of death when they intend to give birth (Population Reports, 1994). Furthermore, women who become pregnant too soon after the previous birth face greater health risks. High values in these are usually associated with high risks. The combination of these risk factors put the women into multiple high risk categories.

**Table 4.1 Percentage of women interviewed, by demographic risk factors, Ethiopia 1990 FFS.**

Demographic risk factors	Place of residence			Total at risk
	Rural	Other urban	Addis Ababa	
<b>Single risk factor:</b>				
Age < 18	12.1	14.9	14.8	13.5
Age > 34	30.1	27.2	26.4	29.0
Birth < 24 months	6.1	3.7	2.4	4.1
Parity 4+	39.6	36.2	34.4	35.4
Subtotal	87.9	82.0	78.0	82.0
Not in any high risk category	12.1	18.0	22.0	18.0
<b>Multiple risk factors:</b>				
Age < 18 and latest birth < 24 months	2.2	1.5	0.4	1.8
Age > 34 and latest birth < 24 months	0.9	0.6	1.0	0.9
Age > 34 and parity 4+	34.2	34.8	31.4	33.5
Age > 34, latest birth < 24m, and parity 4+	1.8	1.1	0.1	1.8
Latest birth < 24 months and parity 4+	4.1	2.1	1.2	2.6
Subtotal	43.2	40.1	34.1	40.2
Not in any multiple risk category	56.8	59.9	65.9	59.8
Number of women interviewed	5913	1293	1551	8757

Source: computed by the Author from the 1990 NFFS data.

**Note:** latest birth less than 24 months refers to women who had their last birth in less than 24 months prior to the survey. It is computed by subtracting the year and/or month the child was born from the survey date.

The data in table 4.1 indicate that the largest proportion of women in Ethiopia were found to fall into : too young, too old and too many categories. Nearly 60 percent of women of reproductive ages (15-49) in Ethiopia start childbearing before the age of 20 (CSA, 1993). Thus these women face a greater risk of mortality than women between ages (19-34). Pregnancy can be dangerous to very young women because they are not physically mature. Moreover, first births and births after three are more dangerous than second through third births.

The majority of women in Ethiopia fell into one or more of the single risk factors. Women who are too young and too old for pregnancy account for about 14% and 29% respectively. High parity women account for about 35.4% in the country, though there is variation by place of residence: rural (39.6%), Other Urban (36.2%), and (34.4%) in Addis Ababa.

Approximately 4.0% of the respondents have had the most recent birth within less than 24 months after the previous birth. Most women in Ethiopia were in at least one high risk category. All these women with single risk factor (age, parity and latest birth less than 24 months) placed the women at an elevated risk of mortality if they plan to give birth.

The risk of death both to the mother and the child becomes severe when the woman had a combination of two or more of the demographic risk factors. In Ethiopia old maternal age in combination with high parity appeared to be the most important multiple risk factor. The proportion of women who fell to this multiple risk factor ranged from 34.2% (rural), 34.8% (other urban areas), and 31.4% ( Addis Ababa). The other multiple risk factor was high

parity women and who had their latest birth in less than 24 months before the survey. The largest proportion of these women were from the rural areas (4.1%) compared with other urban areas (2.1%), and Addis Ababa (1.2%). This means that 4.1% of women interviewed from rural areas had had four or more children and also got pregnant within less than 24 months interval. Thus pregnancies to these group of women is classified as high risk pregnancies.

In Africa as a whole, any one pregnancy is, on average, about 1.66 times more likely to kill than in Asia and 2.86 times than in south America (Population Reports, 1995). High fertility levels in the developing countries particularly in Africa double the relative risk of dying for the women. The problem is reported to be more acute in West and East Africa (Ibid.). Many women in these areas face lack of health care and have more pregnancies in their reproductive periods. As it is indicated on the background characteristics of the study population, nearly 63% of the women interviewed in Ethiopia were illiterate and the majority (> 80%) live in rural areas. That is why the risk of death for mothers associated with pregnancy and childbirth could be severe for rural and non-educated than three children.

#### **4.2. Women's Reproductive Intentions**

The 1990 FFS has collected basic information on fertility intentions/preferences of all women in the sample irrespective of their marital status. Women with no living children at the time of the survey were asked "If you could choose exactly the number of children to have in your life how many would be that?". Women with children on the other hand were

asked the same questions prefaced by: "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be? ". The responses are tabulated in the table below.

**Table 4.2. Percentage distribution of all women interviewed according to total number of children desired by number of living children, Ethiopia, 1990 FFS.**

Number of living children	Total number of children desired					Up to God	Total
	0	1	2	3	4+		
0	0.8	0.7	7.7	3.5	39.0	48.3	100
1	0.4	0.6	4.2	3.7	38.4	52.7	100
2	0.3	0.3	2.2	1.3	34.4	61.5	100
3	0.2	0.4	1.5	1.1	33.1	63.7	100
4+	2.2	0.4	5.6	4.7	21.6	65.5	100
Total	0.5	0.4	3.3	1.8	34.5	59.5	100

**Source:** Computed by the Author from the 1990 FFS data.

The data indicate that the proportion of women who desire more children decreases with an increase in the number of living children. However, the majority of women (i.e., women with no and / or one living child) expressed the need to have more children. Moreover, almost 60 percent of women interviewed were unable to provide numerical responses or their response was "It is up to God". This indicate that social norms govern the fertility behavior of the women in the country.

The number of children desired in most cases are expected to be associated with place of residence, education and the exposure of the women to mass media. The aim of this paper

is not to assess the independent and the relative strength of these variables on the desired number of children. However, changes in women's education and their exposure to IEC could have a significant role in reducing fertility or increasing contraceptive use.

Information on the reproductive intentions of the women is useful to measure the preference or conventional unmet need for family planning. However, women who are or who are not subjected to high risk births should get appropriate information and contraception to alleviate the health risks associated with pregnancy and childbirth.

#### **4.3. The Prevalence of high risk births in Ethiopia.**

It is believed that mother's age at the time of birth, birth interval, and parity are the factors for mortality risk of children. Moreover, children born to the women at risk are more likely to have low birth-weights, and low nutritional status. All these together, put births at a greater risk of illness and death up to age five.

The data in table 4.3. indicate that almost all births that had occurred five years preceding the survey (1990 FFS) had had at least one risk factor. The percentage of births to young mothers (13.0%) reflects the existing early marriage and childbearing norms in the country. Births that had occurred within less than 24 months interval account for 24.2%. The proportion of births that had occurred to mothers who had had four or more children account for 64.3%. The largest proportion of children were born from mothers who had had four or more children.

**Table 4.3. Percentage distribution of children born to the mothers at risk five years preceding the survey and their risk of mortality, Ethiopia, 1990 FFS.**

High risk categories	Percent of births five years preceding the survey		Relative risk (RR)
	Number	Percent	
<b>Single high risk categories</b>			
Age < 18 years	1006	13.0	1.111
Age > 34 years	1337	17.2	(0.92)**
Birth interval < 24 months	1628	24.2	1.817
Birth order 4+	5108	64.3	1.188
Not in any single high risk category	-	-	-
<b>Multiple high risk categories:</b>			
Age < 18 and B.I. < 24 months	91	1.15	1.427
Age > 34 and B.I. < 24 months	22	0.30	(0.69)**
Age > 34 and B.O. 4+	894	11.25	(0.65)**
Age > 34, B.I. <24 months and B.O. 4+	275	3.46	2.407
B.I. < 24 months and B.O. 4+	993	12.50	1.875
Subtotal	2275	28.6	1.367
Not in any Multiple high risk categories	4728	71.4	1.00
$\chi^2$ 106.49067 P < 0.0000			

**Note:** the P value indicates that there is a statistically significant association between births to the women at risk and their relative risk of dying. In other words, chance is an unlikely explanation between high risk births and the risk of death.

\*\*Relative risk shown in brackets indicate a decrease mortality risk.

When it comes to the proportion of births that had occurred to mothers with multiple risk characteristics, births to older mothers with four or more children account for 11.0% of the respondents. The percentage born to young mothers with shorter birth interval duration (< 24 months) was 1.2%, while the percentage of births to those women who had had more than three children and a birth interval of less than 24 months was 12.5%. Moreover, children born to older mothers with short preceding birth interval; and children born to older mothers who had had four and above children and with preceding birth interval less than 24 months account for 0.30% and 3.46% respectively.

In order to examine the association between the risk of child mortality and the demographic risk factors, the relative risk (RR) was computed. In this study the exposure is births to the high risk women and the outcome is death. The value of the relative risk (RR) greater than 1.0 indicate a positive association between exposure and the outcome, while the value less than 1.0 or a fraction means an inverse association or a decreased mortality risk.

Among children born to mothers with single risk characteristics, the most vulnerable births were those that had occurred within less than 24 months interval. Children born within short birth interval were 1.817 times at the mortality risk ( $1.817 - 1.00 = 81.7\%$ ) or 81.7% of them were likely to die than those children born after an interval of 24 months. However, children of older mothers (> 34 years) had a reduced mortality risk (RR=0.92) compared with those born to mothers in the prime reproductive periods (19-34). This could be due to reporting errors (i.e., omission of live-born children, particularly those living in other house holds and those who have died of children born to older mothers especially over age 34).

Furthermore, these mothers are better than others in child care practices and minimize the mortality risk of children. Children born to mothers with more than three children (4+) were also at a greater risk of mortality (1.188 times higher ) compared with the reference category.

The relative risk of children dying of children born to mothers with multiple risk factors, say to older mothers with high parity, and short birth interval was 2.407 times higher than the normal. These children were  $(2.407-1.00=1.407)$  times at a greater risk of death compared with the reference group. Children born to teenage mothers with short birth intervals (< 24 months) were also 1.427 times at mortality risk or 42.7% of these children had experienced mortality risks compared to those children born to mothers in the healthiest reproductive years. With in the multiple risk categories, the highest proportion of births (11.3%) and risk ratio (0.65) were observed among older women with four or more children. Moreover, children born to mothers who had had short preceding birth interval and four or more children account for 12.5% of births and have the relative risk of mortality 1.875 times higher compared with the reference category. On the contrary, births to older mothers with more than three children and had a birth less than 24 months represent the lowest proportion of births (0.30%) and relative risk of dying (RR=0.69).

Table 4.4. Percentage distribution of children born to mothers at risk five years preceding the survey and their relative risk of mortality by urban and rural residence, Ethiopia, 1990 FFS

High risk category	Births five years preceding the survey		Relative risk (RR)
	Number	Percent	
<b>Single high risk category (URBAN )</b>			
Age < 18 years	179	11.5	1.054
Age > 34 years	251	16.6	1.081
Birth interval < 24 months	346	25.7	2.092
Birth order 4+	972	60.0	1.295
<b>Multiple high risk categories:</b>			
Age < 18 and B.I. < 24 months	11	0.69	2.967
Age > 34 and B.I. < 24 months	6	0.38	-
Age > 34 and B.O. 4+	147	9.21	(0.92)
Age > 34, B.I. <24 months and B.O.4+	60	3.78	2.583
B.I. < 24 months and B.O. 4+	205	12.30	1.810
subtotal	429	26.6	1.731
Not in any multiple high risk category	977	73.40	1.00
<b>Single high risk category: (RURAL )</b>			
Age < 18 years	827	13.3	1.105
Age > 34 years	1086	17.5	(0.88)
Birth interval < 24 months	1282	23.7	1.770
Birth Order 4+	4136	65.3	1.145
<b>Multiple high risk categories:</b>			
Age < 18 and B.I. < 24 months	80	1.26	1.250
Age > 34 and B.I. < 24 months	16	0.25	(0.89)
Age > 34 and B.O.4+	747	11.80	(0.58)
Age > 34, B.I. < 24 months and B.O.4+	215	3.49	2.384
Birth interval < 24 months and B.O.4+	788	12.44	1.887
subtotal	1846	33.0	1.309
Not in any multiple high risk category	3751	67.0	1.00

Source :computed by the Author from the 1990 FFS data .

The actual figures used for the computation of the relative risk are shown in annex II(urban) and III (rural).

As shown in table 4.4 in rural areas older maternal age ( $> 34$  years) had the lowest mortality risk for children ( $RR=0.88$ ) among the single demographic risk factors. Other single risk factors: young maternal age, short birth interval, and high birth order placed children at a greater risk of death (1.105, 1.770, and 1.145 times higher) respectively compared with their respective reference categories. Among the multiple risk factors older maternal age and short birth interval; and older maternal age and high birth order had the lowest mortality risk ( $RR=0.89$  and  $0.58$  respectively) for children. This could be due to reporting errors (omission and misreporting of births and deaths). Other multiple risk factors had the relative risk ( $RR$ ) greater than 1.0 indicating higher risk of death for children.

Furthermore, in urban areas (Addis Ababa and Other urban areas) all the single demographic risk factors had a greater mortality risk ( $RR > 1.0$ ). In urban areas of Ethiopia age of the mother (young or old), birth interval and birth order put children at an elevated mortality risk. Moreover, among the multiple risk factors: young maternal age and short preceding birth interval; older maternal age, short birth interval and high birth order; and short birth interval and high birth order placed children at a greater mortality risk (2.967, 2.583, and 1.810 times higher) respectively compared with their respective reference categories. However, the combination of older maternal age and short birth interval; and older maternal age and high birth order had had the lowest mortality risk for children ( $RR = 0.00$  and  $0.92$  respectively).

Generally, the relative risk (RR) indicates that there is a strong association between mortality risks of children and the mother's demographic characteristics. The risk of death for children increases with an increase in the risk characteristics (i.e., in the multiple high risk categories). Some studies (Bicego and Ahmed, 1996) also add biological factors (sex of the child and multiplicity of births) as risk factors for the death of the child. The following table shows the percentage distribution of births five years preceding the survey and their relative risk of dying by biodemographic variables.

**Table 4.5. Percentage distribution of children dead and/or survive by their biodemographic risk factors, Ethiopia, 1990 FFS.**

Biodemographic risk factors	Percentage of children		Total number of births	Relative risk(RR)
	Survive	Dead		
Sex of the child				
Male	85.1	14.9	4092	1.088
Female	86.3	13.7	3855	1.00
$\chi^2$ 0.12972 P 0.71872				
Multiplicity of births				
single	86.1	13.9	7790	1.00
Multiple	63.1	36.9	157	2.655
$\chi^2$ 36.06541 P0.00000				
Birth order (parity)				
1	84.2	15.2	1118	1.188
2-3	86.7	13.3	2264	1.00
4+	80.8	19.2	3442	1.092
$\chi^2$ 4.30061 P 0.11645				
Maternal age at birth				
$\leq 18$	84.0	16.0	1006	1.111
19-34	85.6	14.4	5413	1.00
$>34$	88.8	13.2	1337	(0.92)
$\chi^2$ 3.73752 P0.15431				
Birth interval				
$< 24$ months	79.1	20.9	1628	1.817
$> 24$ months	80.0	11.5	5110	1.00
$\chi^2$ 84.15403 P 0.00000				

Source: computed by the Author from the 1990 NFFS data.

Note: Relative risk shown in brackets indicates a decreased mortality risk

The results of the bivariate analysis in table 4.5 indicate that the percentage of male children dead (14.9%) exceeds that of female children (13.7%). The proportion of children dead born to teenage mothers (16.0%) was higher compared with the proportion of children dying born to the mothers between the age of 19 and 34. However, the percentage of children dead born to older mothers (13.2%) was lower compared with those of the reference category (19-34).

Other biodemographic risk factors except short birth interval and multiple birth category show insignificant association with mortality risk of children. The largest proportion of dead children are observed among those born to the mothers with short birth interval and twin births compared with their respective reference categories. The percentage of children dead to mothers with short birth interval (20.9%) was nearly two times higher compared with the reference category (birth interval > 24 months). The proportion of children dead among first births (15.8%) and high order births (19.2%) exceed the reference category (13.3%). However, first births and births of high order (4+) did not show a significant association with mortality risk of children. This could be due to the confounding effects of short birth interval and /or maternal age at the birth of the child.

The relative risk of dying for children was found to be the highest for twin births (2.665 times higher) compared with the single births. Accordingly, male children, children born to the young mothers; and those born with short birth intervals exhibit higher mortality risk (i.e., 1.088, 1.111, and 1.817 times higher) compared with their reference categories.

Moreover, first births and births of high order had a mortality risk of 1.188 and 1.092 times higher compared with the reference category. Among all the biodemographic factors, it is only multiplicity of births and birth interval which show a significant associations with the mortality risk of children. In general, the effects of all these factors on the mortality risk of children is expected to be high during the first year of life of children than in the later ages.

Reproductive risk factors are highly correlated with women's intentions to space or altogether stop further if and only if the women are aware of the relationship between fertility and risk to both mother and child. The following table shows the distribution of women with their health based family planning (met and/or unmet ) need.

**Table 4.6. Percentage distribution of women (unweighted) at risk with their health based spacing and limiting need, Ethiopia, 1990 NFFS.**

Background characteristics	Women at risk and their;		Total number of women
	Spacing need	Limiting need	
<b>Place of residence</b>	(20.7)	(58.9)	6971
Rural	19.6	63.6	4642
Other urban	25.2	51.9	1046
Addis Ababa	20.8	47.6	1283
<b>Women's education</b>			
No education	11.9	72.2	3464
Primary	33.6	42.3	1669
Junior and higher	36.7	23.9	1568
<b>Women's work status</b>			
Currently working	18.6	63.7	4692
Not currently working	22.6	62.0	2279
<b>Religion</b>			
Christians	22.1	56.3	4771
Muslims	19.7	63.5	1260
Others/Traditional	15.9	68.5	262

Source :Computed by the Author from the 1990 FFS data.

Note: Spacing need refers to women whose age < 18 years and those women (<18) who had a previous birth within less than 24 months. These women are classified as having a spacing need. Women whose age > 34 and have had more than three children or have had a previous birth within less than 24 months are considered to have a limiting need. Thus spacing and limiting need in here are quite different from the woman's preference based need.

Total number of women at risk from the table excludes those women who are not within the too young, too old and too many categories and some missing cases.

The data in the table above point to a need of a program of information, education, and communication (IEC) tailor-made to meet the unmet need of women at risk. It also indicates that the majority of women at risk (58.9%) should use a limiting method than the spacing method (20.7%). Family planning methods appropriate for spacing births include: pill, diaphragm/ foam/ jelly, condom, periodic abstinence, withdrawal, and all other methods, while methods appropriate for limiting family size include: IUD, injection, female or male sterilization or Norplant. The remaining (20.4%) of the women under the study do not need contraception. This is because they may not be at risk. However, these women should be served by the provision of both information and contraceptive services if they do have the desire to space or limit births. In Ethiopia, where early entry into marriage and parenthood, high fertility, highest but declining mortality rates are common, women (too old and too many) should use permanent contraception than temporary methods. Women with high limiting need from the health point of view are mostly rural, non educated and followers of traditional religion. These women are either too old (35 years and above) or have had high parity (four and above children) than others. However, due to the low level of contraceptive prevalence (CSA, 1993:186) the most popular method ever tried during the time of the survey was the Pill followed by safe period (methods appropriate for spacing than limiting births).

Table 4.7 Percentage distribution of women (unweighted) in the high risk category and their met and unmet high risk birth need for family planning, Ethiopia, 1990 FFS.

Socioeconomic characteristics	High risk birth:		Total women at risk (unweighted)
	met need	unmet need	
<b>Place of residence</b>			
Rural	41.3	58.7	327
Urban	42.6	57.4	216
Addis Ababa	45.1	54.9	193
$\chi^2$ 2.71325 P 0.006			
<b>Women's Education</b>			
No Education	36.7	63.3	419
Primary	43.8	56.2	208
Junior & Higher	44.7	55.3	109
$\chi^2$ 4.26476 P 0.0019			
<b>Women's Work Status</b>			
Currently working	37.3	62.7	314
Not currently working	40.0	60.0	422
$\chi^2$ 0.09910 P 0.75292			
<b>Religion</b>			
Christians	41.9	58.1	611
Muslims	41.3	58.7	92
Others/Traditional	39.4	60.4	33
$\chi^2$ 1.40990 P 0.49413			
<b>Husband's Education</b>			
No education	47.8	52.2	690
Primary	43.5	56.5	23
Junior & Higher	42.5	57.5	23
$\chi^2$ 0.26600 P 0.87546			
<b>Husbands Work Status</b>			
Currently working	39.1	60.9	138
Not currently working	43.5	56.5	598
$\chi^2$ 0.87187 P 0.35044			

Source: computed by the Author from the 1990 NFFS data.

In general, women who had a risk characteristic and not using family planning are classified as having unmet high risk birth need. On the contrary, those women who were at risk of conceiving a high risk birth but using family planning are referred as met high risk birth need. Accordingly, the following table shows the distribution of all women with met and/or unmet high risk birth need by their socioeconomic characteristics.

The data from table 4.7 indicate that the proportion of women at risk who used family planning to space and/or limit births (met high risk birth need) is smaller compared with non users (unmet high risk birth need). This could be due to lack of awareness of the utility of family planning as well as the relative inaccessibility of the service.

Note: Total number of women at risk refers to those women currently not pregnant and who have heard of at least one family planning method and currently using or not using contraception. It does not refer to all women at risk.

Table 4.8 Percentage distribution of women by their main reasons for not using family planning methods and their place of residence, Ethiopia, FFS.

Main reasons for not using FP	Place of Residence		
	Rural	Other Urban	Addis Ababa
Opposition from husband, families and communities	7.4	16.2	21.0
Health Concerns (Side effects) about contraceptives	2.4	31.4	36.1
Difficulties with access to FP services	39.8	15.7	13.4
Lack of information	29.4	15.8	10.0
Little Perceived risk of pregnancy	21.0	20.9	19.5
$\chi^2$ 222.19921 P0.00000			

Source: Computed by the Author from the 1990 FFS.

Rural women in Ethiopia cite difficulties with access to family planning services (39.8%), lack of information (29.4%), little perceived risk of pregnancy (21.0%), and opposition from husband and his families (7.4%) as the main reasons for not using family planning methods. Little perceived risk of pregnancy refers to women who rarely had sexual relations and women who are too old because these women consider that they will not conceive.

Women from other urban areas cite health concerns about contraceptives (31.4%), little perceived risk of pregnancy (20.9%), Opposition from husband and his families (16.2%) and lack of information (15.8%) as the main reasons for not using family planning methods.

Women from Addis Ababa also cite health concerns about contraceptives (36.1%), Opposition from husband and his families (21.0%), little perceived risk of pregnancy (19.5%) and difficulties with access to family planning services (13.4%) as the main reasons for not using contraception. Difficulties with access to family planning services and

lack of information appeared as the main problem for not using the methods by rural women compared with women from Addis Ababa and Other urban areas. Moreover, lack of awareness of any contraceptive method is most likely to explain unmet need in countries like Ethiopia where there is low contraceptive prevalence rate (4.0%) at the time of the survey. All the above responses that women had cited as the main reasons for not using family planning suggest lack of information about reproduction and contraceptive use among women interviewed. Thus unmet need for family planning could be greater among non-educated and rural women because they are expected to have low access to family planning methods. However, detailed studies in the future may offer a clear view on the relationship between contraceptive use or non use and sociocultural factors all over the country.

The bivariate analysis indicates that among the socioeconomic characteristics of women, place of residence, and women's education have a significant association with the use or non-use of family planning methods. Other socioeconomic characteristics, husband's education, women's and husband's work status do not have a significant association with unmet family planning need to avoid or prevent high risk pregnancies. This could be due to differences in socioeconomic status particularly the level of education. Moreover, among the religious groups, unmet high risk birth need is found to be lower among Christians than Muslims and those with followers of traditional religion. On the average, 60% of women with

high risk categories did not use family planning (had unmet high risk birth need) to alleviate the problem.

## CHAPTER FIVE

### MULTIVARIATE ANALYSIS

#### 5.1. Biodemographic factors and mortality risk of children.

In the preceding chapter relative risk (RR) have been computed for births that have occurred five years preceding the survey to the women at risk. The association between common biodemographic variables (Sex of the child, multiplicity of birth, age of the mother at the birth of the child, parity (birth order) and the preceding birth interval) and child's risk of death was also examined. The goal of using the relative risk (RR) was simply to see the strength and consistency of the association between these variables and mortality risk of children. However, it does not indicate which of these risk factor(s), are the dominant cause of death. Thus, in order to identify one or more of the risk factors, this study used the logistic regression model. In here it is assumed that the model can provide a valid estimate of the association between risk factors and the mortality risk of children in terms of an odds ratio.

The risk of illness and death associated with high risk births can be controlled if parents are in a position to plan their fertility. Accordingly, it is suggested that reproductive risks among women and their children can be reduced through the use of family planning. However, women's fertility behavior and contraceptive use are influenced by their Socioeconomic characteristics. The logistic regression model has also been used to identify the most

important variable(s) that could explain the risk of non-use of family planning methods among women at risk.

The results of the logistic regression analysis for the biodemographic risk factors are indicated in table 5.1. The risk of death for male children was 1.0853 times higher indicating a greater risk of mortality for male than female children. The regression coefficient for male children was also 0.0819 indicating positive association between sex of the child and the risk of deaths. This agrees with the expectation that male children have higher mortality risk than female children. However, the result is not statistically significant.

Furthermore, twin births were 3.2193 times at a greater risk of death compared with single births. However, like in many other countries twinning is a relatively rare event and only 2 percent of births (157) in the five years preceding the survey were reported to be twin births. The association between twin births and mortality risk of children was however, statistically significant. Twin births were found to be at a greater risk of mortality due to competition for resources (i.e., before and after birth), time and attention after birth.

The risk of death for first and high order births (4+) was 0.6962 and -0.3250 times compared with the reference category (birth order 2-3). First births therefore appeared to experience higher mortality risk. On the other hand, high order births were found to have a negative association or reduced mortality risk. The effect of high order birth on mortality risk of children is expected to be smaller in areas of high mortality and high fertility countries

(Bicego and Ahmed, 1996). The risks associated with first births was 2.006 times higher and the result is statistically significant. First births carry about 100 percent higher child mortality risk than the reference group. This could be due to lack of maternal health services for young mothers and their low experience and knowledge about pregnancy and childbirth. The majority of adolescent women (married and unmarried) who want to space or delay births did not use family planning methods and were liable for unintended pregnancy and childbirth. This could be due to lack of information, fear of side effects, and barriers to access and use which prevent them from obtaining and using contraception.

Short birth intervals (less than 24 months) appeared to be the most important demographic risk factors most likely to increase mortality risk for children. The risk of death associated with short birth interval was 1.9786 times higher (or by 98 percent greater) compared with intervals of 24 months and above. In this study short birth interval explains mortality risk of children than any other demographic factors. John Hobcraft and colleagues (1985) using WFS data from over 30 countries have also found that short birth intervals are the main cause for many infant and child deaths. Moreover, the result indicate that there is a potential for improvement of child and /or mother's health and survival through adequate spacing. If couples were in a position to space or limit births they could minimize mortality risk of children.

The odds (risk) of death for children of younger and older mothers was 1.214 and 0.8961 respectively. However, the effect of maternal age at the birth of the child was not significant. This is because birth order and maternal age at birth are highly correlated. Moreover, mortality risk to children of older women show a decreased risk than the reference category (0.8961). In general, short birth interval, twins, and first births in the model appeared as important biodemographic risk factors for the mortality risk of children.

**Table 5.1. Results of the logistic regression analysis of mortality risk of children by biodemographic risk factors, Ethiopia, 1990 FFS.**

Biodemographic risk factors	B	Std. error	Wald	Exp (B)
<b>Sex of the child</b>				
(Female)				
Male	.0819	.0721	1.2897	1.0853
<b>Multiplicity of births</b>				
(Not twins)				
twins	1.1692***	.2618	19.9470	3.2193
<b>Birth order (Parity)</b>				
(2-3)				
1	.6962	.1468	22.4759	2.0061
4+	-.3250	.1284	6.4109	0.7225
<b>Birth Interval</b>				
(>24 months)				
(<24 months)	.6824***	.0759	80.7937	1.9786
<b>Maternal age at birth</b>				
(19-34)				
<18	.1935	0.1324	2.1384	1.2135
>34	-.1095	0.0952	1.3289	0.8961

-.Log likelihood 5202.73 3 Degree of freedom 2 \*\*\* significant at 0.001 lever.

## 5.2. Socioeconomic determinants of unmet high risk birth need for Family planning.

Table 5.2 indicates the results of the logistic regression model for the unmet family planning need of the women at risk and their socioeconomic characteristics.

Table 5.2. Results of the logistic regression model on the determinants of unmet high risk birth for family planning, Ethiopia, 1990 FFS.

Socioeconomic variables	B	Stand. error	Wald	Exp (B)
<b>Women's education</b>				
(Junior and higher)				
No education	2.2870****	.4552	7.1523	9.8458
Primary	2.1502****	.4690	6.1174	8.5866
<b>Place of residence</b>				
(Addis Ababa)				
Rural	0.7577**	0.2073	6.4961	2.1333
Other urban	0.0537	0.1776	0.0915	1.0552
<b>Religion</b>				
(Christians)				
Muslims	-0.0118	0.3961	0.0009	0.9883
Others/Traditional	1.0088	0.6364	2.5131	2.7423
<b>Women's work status</b>				
(Currently working)				
Not currently working	0.4277	0.3747	1.3028	1.5337
<b>Husband's education</b>				
(Junior & higher)				
No education	-1.0157	0.5909	2.9545	0.3621
Primary	-0.3438	0.6594	0.2719	0.7091
<b>Husband's work status</b>				
(Currently working)				
Not currently working	0.8740	0.4328	4.7080	2.3966

Note: Variables in the parentheses indicate the reference categories (coded as 0). \*\* Sig at 0.001 \*\* Sig at 0.05  
Dependent variable: met HRB need (coded as 0) and unmet HRB need (coded as 1).

Women's education was found to be significant in the model among other socioeconomic variables. The risk of non-use of family planning to avoid high risk pregnancies is 9.846 and 8.587 times higher for non educated and primary school attended mothers compared with the reference category (Junior and higher level of education). The result is statistically significant at  $P < 0.001$ . Therefore, the lower the level of education of the women, the higher the unmet need for family planning to avoid high risk births

Women's level of education and their place of residence (Rural or Urban) could influence their level of awareness about the existence of contraceptive methods, the variety of the methods, and the source they can be obtained. Furthermore, women's education also affects the use of contraception. Women with primary education are much more likely to use a contraceptive method to avoid high risk births than women with no education but not as likely as women with secondary education or more. Thus, well educated and urban women are expected to use family planning and are less likely to have unmet high risk birth need compared with others.

Moreover, rural women have a higher risk of unmet high risk birth need (2.133 times higher) compared with other urban and particularly with Addis Ababa (reference category). The result was also statistically significant. Though the results was not statistically significant, women in other urban areas are also likely not to use family planning than women in the reference category. However, the difference in the unmet

high risk birth need for family planning to avoid high risk births between women in other urban areas and Addis Ababa is smaller ( i. e., 1.0552-1.00).

Moreover, the use of family planning in Ethiopia at the time of the survey was lower (3.9%) for all women, and less educated mothers were at a much higher risk of non-use of contraception to avoid high risk births than the better-educated mothers. Low use of family planning by itself is an indicator of uncontrolled fertility behavior resulting high maternal ,infant, and child mortality. Both the pattern of fertility and unmet high risk birth need are therefore negatively associated with the level of education of the women in particular.

Women with traditional religion and those not working were more likely to have unmet high risk birth need for family planning. However, the results were not statistically significant. Women's religion and work status do not show an association with met or unmet high risk birth need for family planning of the women under the study. Similarly, husband's education is negatively associated with unmet high risk birth need for family planning. The risk of non use of family planning is higher for the women whose husband's did not participate in the labor force than their counterparts. However, husband's education was found to be an insignificant predictor of unmet high risk birth need for family planning to avoid high risk births.

The unmet need for family planning of the women at reproductive health risk should not be totally considered as a need for contraception, but could also be for better information and improved health services (Maternity care and delivery services).

## SUMMARY, CONCLUSION AND RECOMMENDATION

This study has attempted to identify women and children in the high-risk categories. Its primary focus is on the demographic risk factors: age, parity, and birth interval to explain mortality risks. These factors impact on mortality risks mothers face either singly (a single risk factor) or in combination (multiple risk factors). Recently it is reported by the Ministry of Health (1998) that the risk of death associated with pregnancy and childbirth in Ethiopia did not show a significant change overtime like that of children. However, there is a scarcity of reliable data to estimate maternal mortality. The problem is expected to be severe among the rural women where medical facilities and reproductive health/family planning services are lacking. Furthermore, the majority of rural women are married before age 20. Thus, childbearing among rural women could endanger their health and survival chances.

Women in single risk categories are those who get pregnant while they are still under 18, those who get pregnant after the age of 34 and those of high parity and have a birth before 24 months. Women in multiple risk categories are those who have a combination of more than one risk factor like high parity and short birth interval, high parity and pregnancy after the age of 34, etc. Many women in sub-Saharan Africa countries fell into single risk categories and a combination of high parity and older maternal age. This study also found similar results to those of sub-Saharan African countries.

problems in obtaining method re-supplies. Current users mentioned varieties of reasons as obstacles to their method re-supply.

Table 4.5.3 Distribution of current users who encountered problems in obtaining re-supplies of their methods by problems encountered

Non-availability of service delivery outlets for re-supply of the chosen method of FP	Yes	%	31.5
	No	%	68.5
Distance of service delivery outlets for re-supply of the chosen method of FP	Yes	%	22.3
	No	%	77.7
Service delivery outlets timing for re-supply of the chosen method of FP	Yes	%	25.4
	No	%	74.6
Stock out of the chosen method of FP	Yes	%	12.3
	No	%	87.7
Non-availability of provider for re-supply of the chosen method of FP	Yes	%	12.3
	No	%	87.7
Non-availability of female provider for re-supply of the chosen method of FP	Yes	%	4.6
	No	%	95.4
Non-willingness of provider to give free re-supply as per government rules	Yes	%	9.2
	No	%	90.8
Expiry stock of the service delivery outlets for re-supply of the chosen method of FP	Yes	%	7.7
	No	%	92.3

factors. Among the demographic risk factors, short birth interval and first order births explain the risk of childhood mortality more than other factors. The relationship between these demographic risk factors and mortality risk of children was also statistically significant.

The risk of death for children born with short birth interval was 1.9786 times higher compared with the reference category. Thus, children born within short birth interval were at an increased mortality risk than those born after an interval of 24 months. Moreover, first order births also appeared to experience an elevated mortality risk (2.0061 times higher) and the result was statistically significant. Furthermore, the mother's health and survival status could also be affected by the pace of childbearing. This is a special problem in Ethiopia where the prevalence of contraceptive use is very low.

The result of the logistic regression analysis identified women's education as the main explanatory variable for unmet high risk birth need for family planning. The risk of non use of family planning methods to avoid high risk pregnancies is higher among the non-educated women followed by those with primary level of education. In general, the use of family planning methods can help to protect women and their children from an elevated mortality risk.

In areas where the risk of dying from pregnancy and childbirth related causes are high, the use of family planning methods could play a paramount role. Generally, women at risk and their husband's may benefit from information on reproductive health risks.

Thus, to reduce the prevalence of high risk births and its negative health consequences in Ethiopia, the following steps are recommended

1. Family planning methods of all types should be provided for all sexually active women as well as men, rural as well as urban, less educated as well as more educated citizens in the country. These methods are more likely to reduce both fertility and mortality, and in particular the prevalence of high risk births in the country.

2. The age at marriage is lowest in sub-Saharan Africa in women who marry for the first time while still very young, say around the age of 15 in Ethiopia. Thus, raising the legal age at first marriage particularly in rural areas should be given due emphasis by the government and the society at large to reduce both fertility and the risk of death associated with pregnancy and childbirth. The effort to raise the legal age at first marriage should be accompanied by significantly expanding reproductive health/family planning services in both rural and urban areas.

3. The gap in education between girls and boys must be closed. Efforts must be increased to significantly increase female participation in training in science and technology.

4. Reproductive health /family planning services should be geared to address the problems posed by short birth intervals and teen- age pregnancies.

In general, there is a need to carry out national family and fertility surveys to evaluate whether there is a significant change on the fertility and mortality patterns in Ethiopia

overtime. There is also a need to conduct a research on maternal mortality and identify the root causes of maternal deaths at the national level for appropriate intervention.

## Annex I.

### Distribution of live births that occur to the mothers at risk five years preceding the survey and their relative risk of mortality, Ethiopia, 1990 FFS.

High risk categories	Number of children		Total	Relative risk (RR)
	survive	Dead		
Single high risk categories:				
Age < 18 years	845	161	1006	1.111
Age 19-34 years	4633	780	5413	1.00
Age > 34 years	1161	176	1337	(0.92)
Birth interval < 24 months	4333	775	5108	1.188
Birth interval > 24 months	2475	364	2839	1.00
Birth order 4+	1288	340	1628	1.817
Birth order < 4	4521	589	5110	1.00
Multiple high risk categories:				
Age < 18 and B.I. < 24 months	74	17	91	1.427
Age > 19-34 and B.I. >24 months	2305	347	2652	1.00
Age > 34 and B.I. < 24 months	20	2	22	(0.69)
Age 19-34 and B.I. > 24 months	2305	347	2652	1.00
Age > 34 and B.o. 4+	796	98	894	(0.65)
Age > 34 and B.O. <4	603	122	725	1.00
Age > 34 , B.I.< 24 months & B.O. 4+	218	57	275	2.407
Age 19-34, B.I. > 24 months & B.O. < 4	960	90	1050	1.00
Birth Interval < 24 months & B.O. 4+	770	223	993	1.875
Birth Interval < 24 months & B.O. <4	265	36	301	1.00
<b><math>\chi^2</math> 106.49067 P0.00000</b>				

**Source:** Computed by the Author from the 1990 FFS data.

**Note:** Relative risk shown in brackets indicate a decrease mortality risk.

**Relative risk (RR)=Risk in exposed/ Risk in unexposed.**

## Annex II

**Distribution of live births that occur to the mothers at risk five years preceding the survey and their relative risk of mortality, urban Ethiopia, 1990 FFS**

High risk categories	Number of children		Total	Relative risk (RR)
	Survive	Dead		
Single high risk category:				
Age < 18 years	158	21	179	1.054
Age 19-34 years	984	123	1107	1.00
Age > 34 years	221	30	251	1.081
Birth interval <24 months	283	63	346	2.092
Birth interval > 24 months	889	85	974	1.00
Birth order 4+	852	120	972	1.295
Birth order < 4	579	61	640	1.00
$\chi^2 65.24101$ P0.00000				
Multiple high risk categories:				
Age < 18 and B.I. < 24 months	8	3	11	2.967
Age > 18 and B.I. > 24 months	446	45	491	1.00
Age > 34 and B.I. < 24 months	6	-	6	-
Age < 34 and B.I. > 24 months	446	45	491	1.00
Age >34 and B.O.4+	133	14	147	(0.92)
Age < 34 and B.O.< 4	175	20	195	1.00
Age > 34 ,B.I.< 24 months and B.O.4+	47	13	60	2.583
Age < 34 ,B.I.> 24 months and B.O. <4	197	18	215	1.00
Birth interval < 24 moths and Birth Order 4+	166	39	205	1.810
Birth interval > 24 months and Birth Order < 4	68	8	76	1.00
$\chi^2 92.53698$ P0.0000				

Source: Computed by the author from the 1990 FFS data

**Note:** Relative risk shown in brackets indicate a decrease mortality risk.  
**Relative risk (RR)= Risk in exposed/ Risk in unexposed.**

### Annex III

**Distribution of live births that occur to the mothers at risk five years preceding the survey and their relative risk of mortality , rural Ethiopia, 1990 FFS.**

High risk categories	Number of children		Total	Relative risk (RR)
	Survive	Dead		
<b>Single high risk category:</b>				
Age < 18 years	687	140	827	1.105
Age 19-34 years	3649	657	4306	1.00
Age > 34 years	940	146	1086	(0.88)
Birth Interval < 24 months	1005	277	1282	1.770
Birth Interval > 24 months	3632	504	4136	1.00
Birth Order 4+	4381	655	4136	1.145
Birth Order < 4	1896	303	2199	1.00
x <sup>2</sup> 65.24101 P0.00000				
<b>Multiple high risk categories</b>				
Age < 18 and B.I. < 24 months	66	14	80	1.250
Age > 18 and B.I. > 24 months	1859	302	2161	1.00
Age > 34 and B.I. < 24 months	14	2	16	(0.89)
Age < 34 and B.I. > 24 months	1859	302	2161	1.00
Age > 34 and B.O. 4+	663	84	747	(0.58)
Age > 34 and B.O. <4	428	102	530	1.00
Age > 34, B.I., < 24 months and B.O. 4+	171	44	215	2.384
Age > 34, B.I. < 24 months and B.O. <4	763	72	835	1.00
Birth Interval < 24 months and Birth Order 4+	604	184	788	1.887
Birth Interval >24 months and Birth Order < 4	197	28	225	1.00
x <sup>2</sup> 92.53698 P0.00000				

Source: computed by the author from the 1990 FFS data

Note: Relative risk shown in brackets indicate a decrease mortality risk.

**Relative risk (RR)=Risk in exposed/ Risk in unexposed.**

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## Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in any other University and that all sources of material used for the thesis have been duly acknowledged.

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